



Advanced Power MOSFET

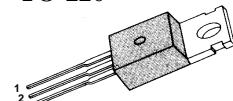
SFP9630

## FEATURES

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : -10  $\mu$ A (Max.) @  $V_{DS} = -200V$
- Low  $R_{DS(ON)}$  : 0.581  $\Omega$  (Typ.)

 $BV_{DSS} = -200 V$  $R_{DS(on)} = 0.8 \Omega$  $I_D = -6.5 A$ 

TO-220



## Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	-200	V
$I_D$	Continuous Drain Current ( $T_C=25^\circ C$ )	-6.5	A
	Continuous Drain Current ( $T_C=100^\circ C$ )	-4.0	
$I_{DM}$	Drain Current-Pulsed	① -26	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulsed Avalanche Energy	② 563	mJ
$I_{AR}$	Avalanche Current	① -6.5	A
$E_{AR}$	Repetitive Avalanche Energy	① 7.0	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$	③ -5.0	V/ns
$P_D$	Total Power Dissipation ( $T_C=25^\circ C$ )	70	W
	Linear Derating Factor	0.56	$W/\text{ }^\circ C$
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	- 55 to +150	$^\circ C$
	Maximum Lead Temp. for Soldering Purposes, 1/8 " from case for 5-seconds	300	

## Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	1.79	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink	0.5	--	
$R_{\theta JA}$	Junction-to-Ambient	--	62.5	

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## Electrical Characteristics ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	-200	--	--	V	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=-250\mu\text{A}$
$\Delta \text{BV}/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	-0.17	--	$^\circ\text{C}$	$\text{I}_D=-250\mu\text{A}$ See Fig 7
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	-2.0	--	-4.0	V	$\text{V}_{\text{DS}}=-5\text{V}, \text{I}_D=-250\mu\text{A}$
$\text{I}_{\text{GSS}}$	Gate-Source Leakage , Forward	--	--	-100	nA	$\text{V}_{\text{GS}}=-30\text{V}$
	Gate-Source Leakage , Reverse	--	--	100		$\text{V}_{\text{GS}}=30\text{V}$
$\text{I}_{\text{DSS}}$	Drain-to-Source Leakage Current	--	--	-10	$\mu\text{A}$	$\text{V}_{\text{DS}}=-200\text{V}$
		--	--	-100		$\text{V}_{\text{DS}}=-160\text{V}, \text{T}_C=125^\circ\text{C}$
$\text{R}_{\text{DS(on)}}$	Static Drain-Source On-State Resistance	--	--	0.8	$\Omega$	$\text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-3.3\text{A}$ ④
$\text{g}_{\text{fs}}$	Forward Transconductance	--	4.2	--	$\Omega$	$\text{V}_{\text{DS}}=-40\text{V}, \text{I}_D=-3.3\text{A}$ ④
$\text{C}_{\text{iss}}$	Input Capacitance	--	740	965	pF	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=-25\text{V}, f=1\text{MHz}$ See Fig 5
$\text{C}_{\text{oss}}$	Output Capacitance	--	125	185		
$\text{C}_{\text{rss}}$	Reverse Transfer Capacitance	--	49	75		
$t_{\text{d(on)}}$	Turn-On Delay Time	--	14	35	ns	$\text{V}_{\text{DD}}=-100\text{V}, \text{I}_D=-6.5\text{A}, \text{R}_G=12\Omega$ See Fig 13 ④ ⑤
$t_r$	Rise Time	--	22	55		
$t_{\text{d(off)}}$	Turn-Off Delay Time	--	41	90		
$t_f$	Fall Time	--	17	45		
$\text{Q}_g$	Total Gate Charge	--	29	36	nC	$\text{V}_{\text{DS}}=-160\text{V}, \text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-6.5\text{A}$ See Fig 6 & Fig 12 ④ ⑤
$\text{Q}_{\text{gs}}$	Gate-Source Charge	--	5.8	--		
$\text{Q}_{\text{gd}}$	Gate-Drain( " Miller " ) Charge	--	13.6	--		

## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
$\text{I}_S$	Continuous Source Current	--	--	-6.5	A	Integral reverse pn-diode in the MOSFET
$\text{I}_{\text{SM}}$	Pulsed-Source Current ①	--	--	-26		
$\text{V}_{\text{SD}}$	Diode Forward Voltage ④	--	--	-5.0	V	$\text{T}_J=25^\circ\text{C}, \text{I}_S=-6.5\text{A}, \text{V}_{\text{GS}}=0\text{V}$
$\text{t}_{\text{rr}}$	Reverse Recovery Time	--	160	--	ns	$\text{T}_J=25^\circ\text{C}, \text{I}_F=-6.5\text{A}$ $d\text{I}_F/dt=100\text{A}/\mu\text{s}$ ④
$\text{Q}_{\text{rr}}$	Reverse Recovery Charge	--	0.96	--		

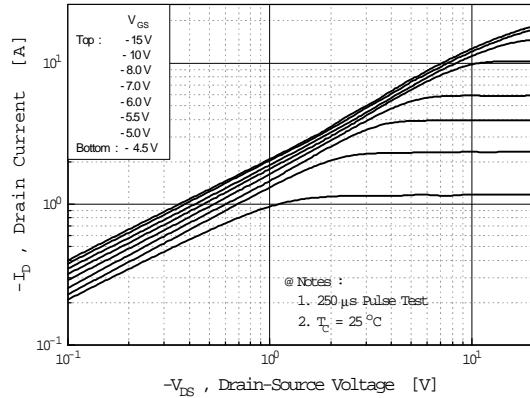
### Notes :

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ②  $L=20\text{mH}, \text{I}_{AS}=-6.5\text{A}, \text{V}_{DD}=-50\text{V}, \text{R}_G=27\Omega^*$ , Starting  $\text{T}_J=25^\circ\text{C}$
- ③  $\text{I}_{SD} \leq -6.5\text{A}, d\text{I}/dt \leq 400\text{A}/\mu\text{s}, \text{V}_{DD} \leq \text{BV}_{\text{DSS}}$ , Starting  $\text{T}_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width =  $250\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature

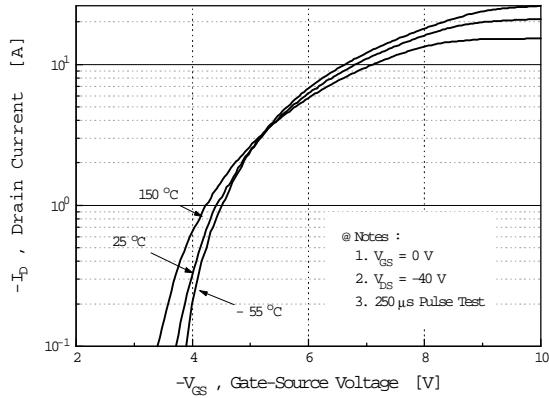
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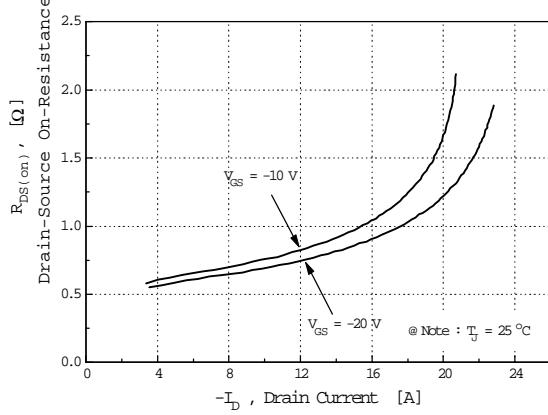
**Fig 1. Output Characteristics**



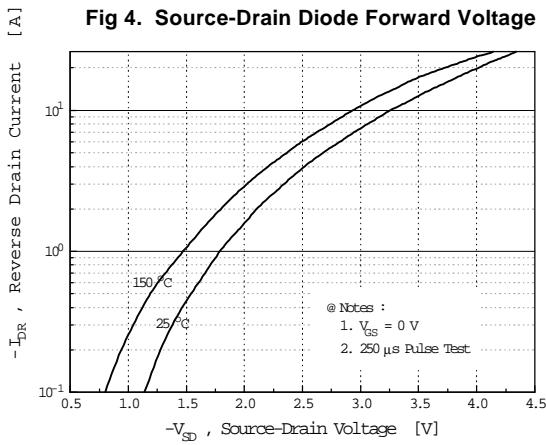
**Fig 2. Transfer Characteristics**



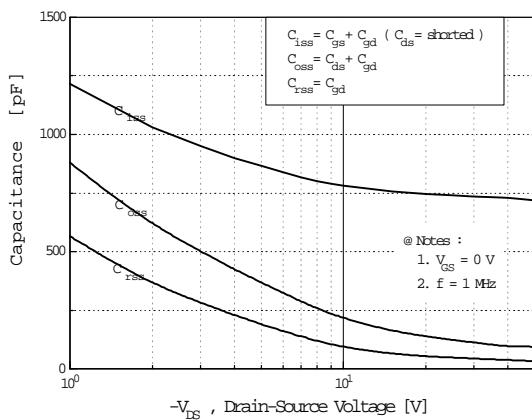
**Fig 3. On-Resistance vs. Drain Current**



**Fig 4. Source-Drain Diode Forward Voltage**



**Fig 5. Capacitance vs. Drain-Source Voltage**



**Fig 6. Gate Charge vs. Gate-Source Voltage**

